

Intermediate Tracker in sPHENIX

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sPHENIX Task Force for Inner Detector Integration
March 16th, 2017

INTT Requests

6. Any other useful information that the subsystem **wishes** for the task force to address/consider?

Answer (INTT Requests):

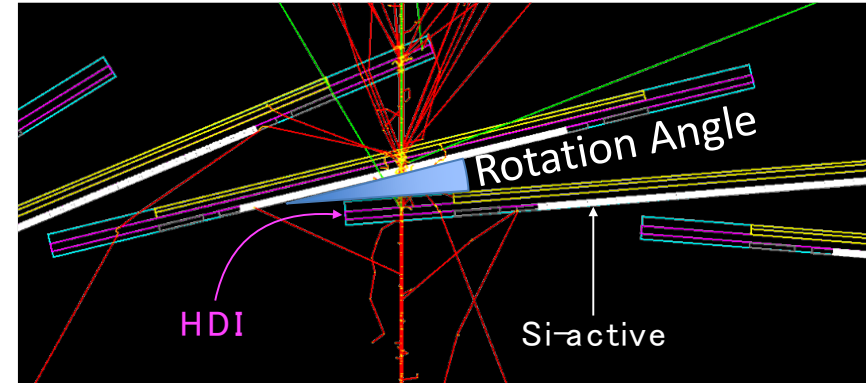
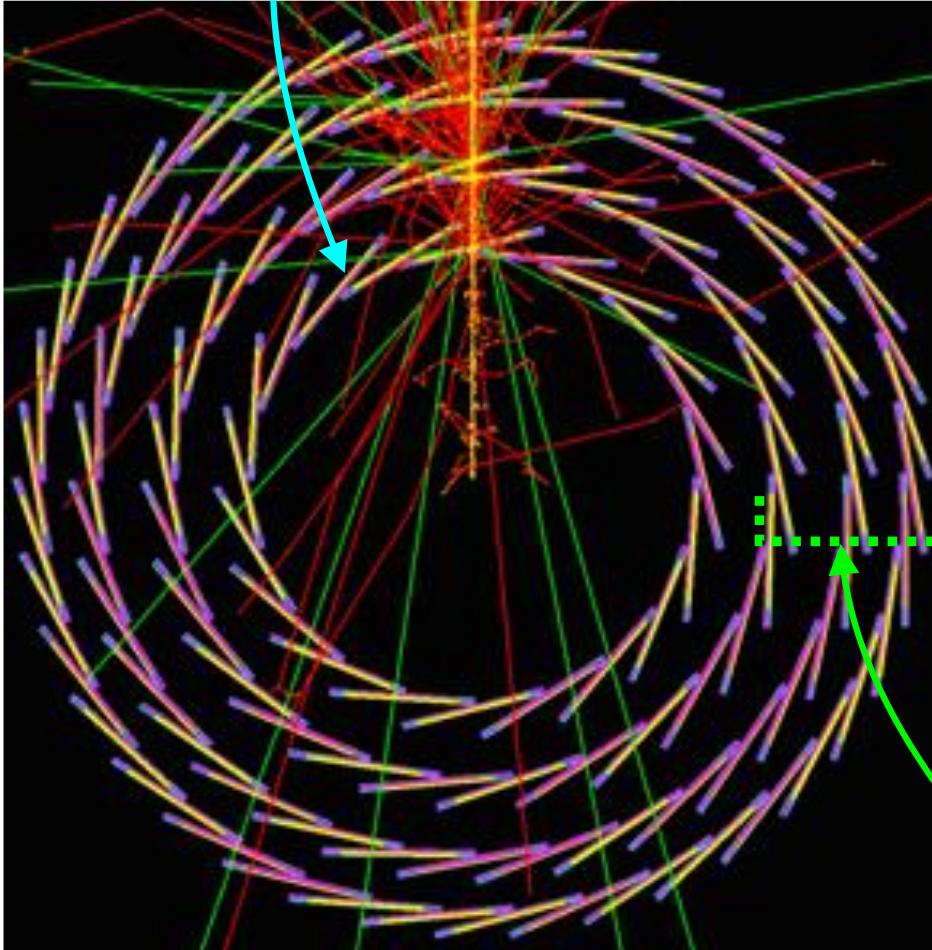
1 - **Modular Integration**: we would like to install or remove INTT barrels around beam pipe without interfering with other sub-detectors

Example: removing INTT without removing MAPS detector: MAPS/INTT two independent detectors.

2 – Cooling of INTT and ROCs **should be independent** of cooling of other **sub-detectors (MAPS)**: cooling temperature can change from one detector to another detector: **lesson learned from VTX/FVTX.**

INTT Barrels Configuration: necessary information for the design

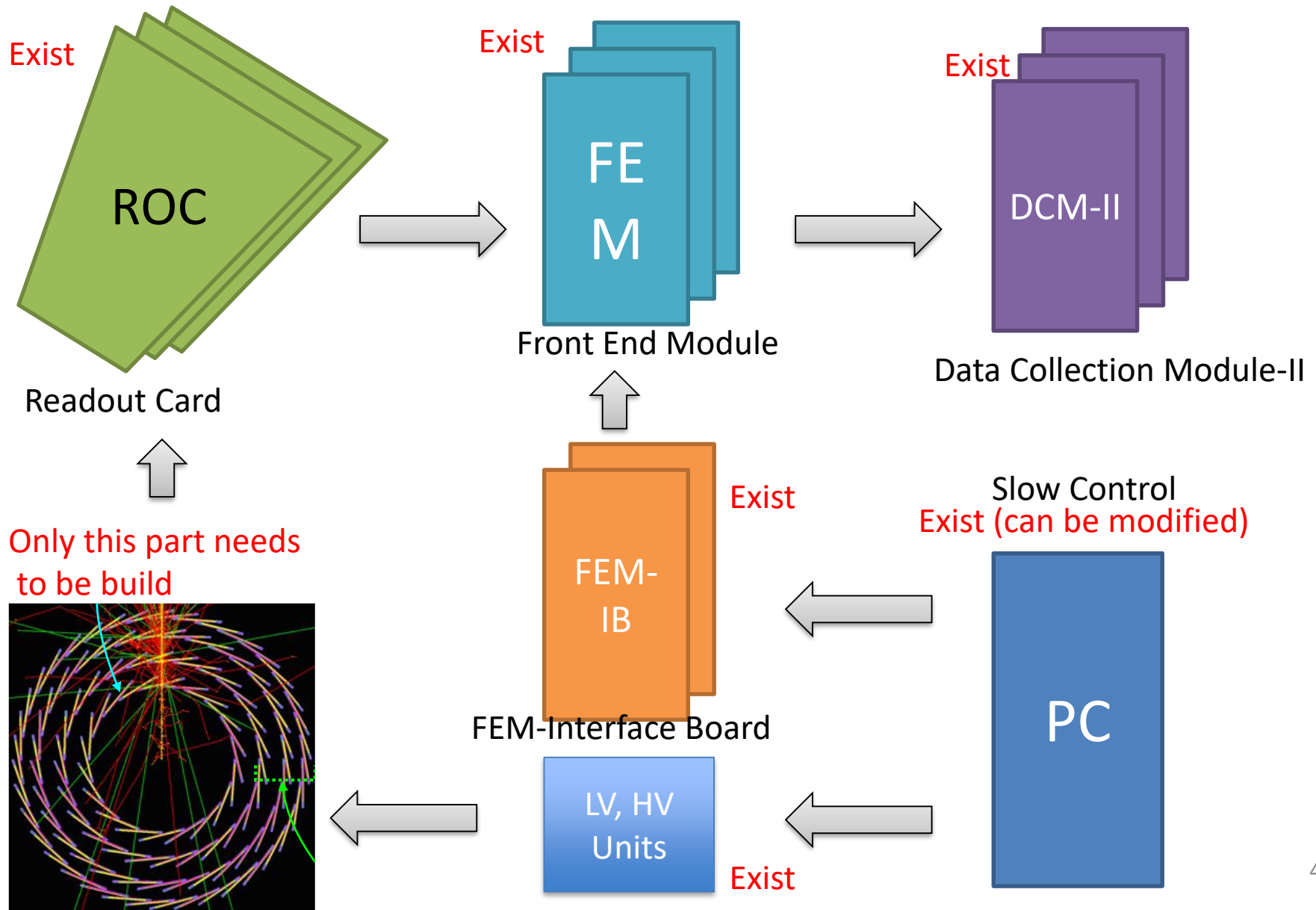
- Number of ladders per barrel
- Angle of rotation of ladder in given ladder



Layer	Radius [mm]	# of Ladders	Rotation Angle [deg]
0	60	20	14.0
1	80	26	14.0
2	100	32	12.0
3	120	38	11.5

INTT Readout Chain

INTT Readout Chain Already Exists: Reuse FVTX



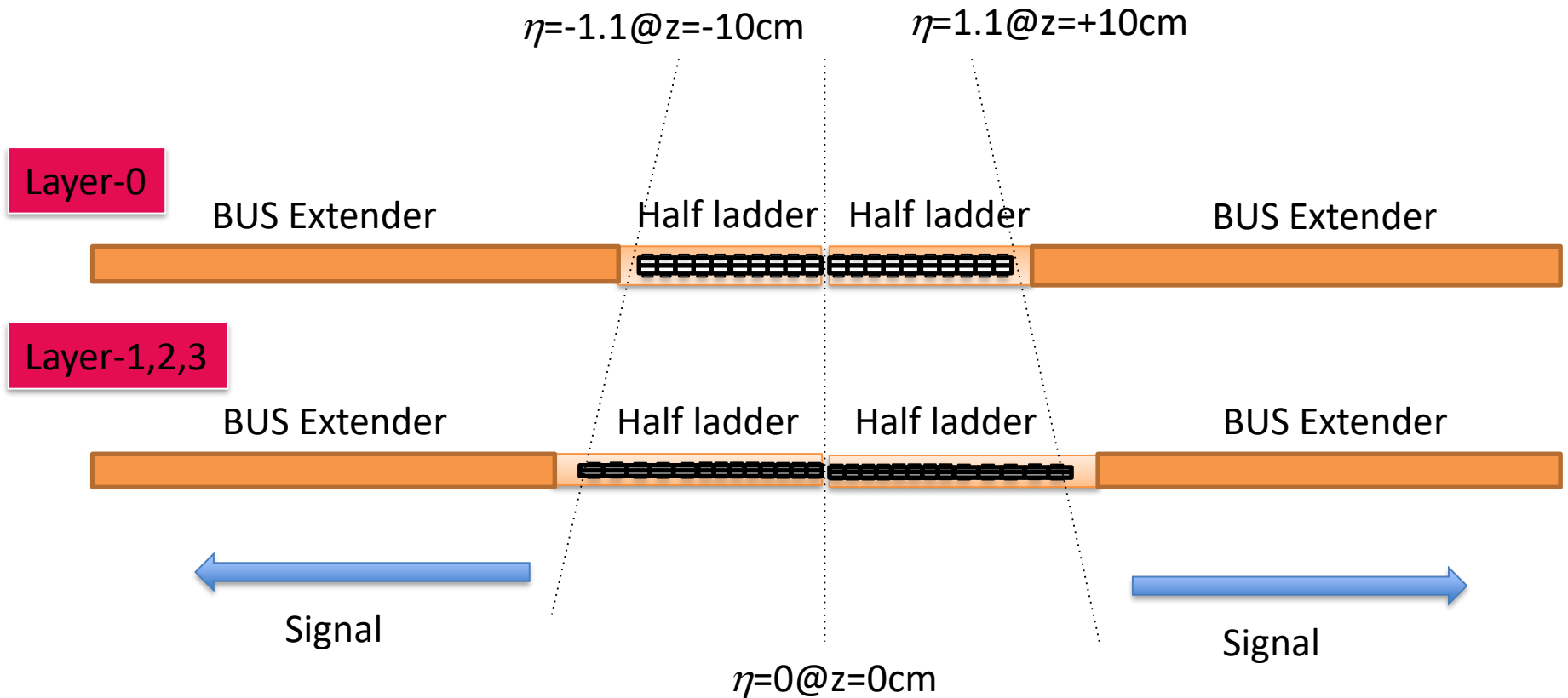
Racks and VME Crates

The entire read-out chain of FVTX system will be re-used in INTT.
This will reduce the cost by half and save 2 years of R&D phase.



Readouts from Both North and South Sides

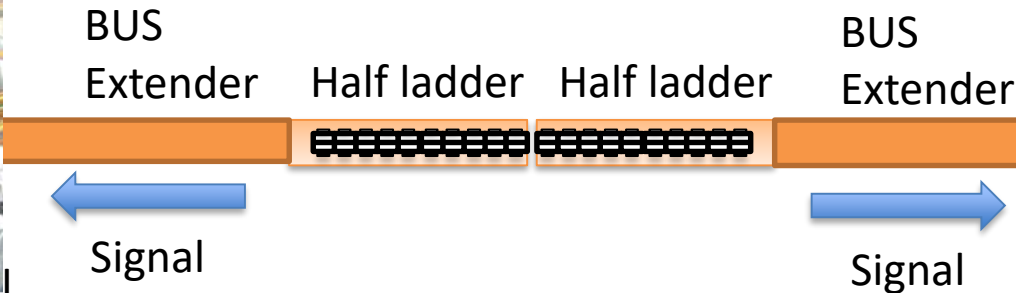
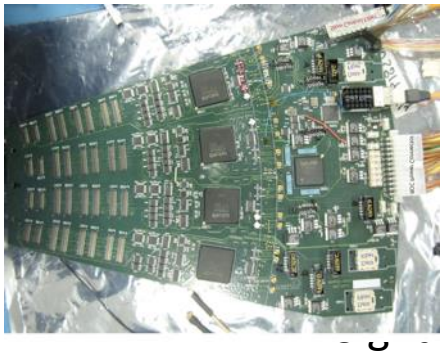
Signals are transferred from HDIs to outside (TPC zone) by BUS extenders



INTT Readout

- Each half ladder is connected to **one port** on the **ROC**

ROC



ROC



- ROC Ports Configuration

	INTT		Available # of Ports
Layer-0	36	<	48
Layer-1,2,3	90	<	144

Number of ports to be used nicely fits within available number of ports

1. Cables, Fibers, Electronics

ROC



→ LV Power/ 11 conductors → Local Power ROC

→ 4 x 12 fibers optical cables Data

→ 1 duplex fibers optical cable for Slow Control

→ 4 x 8 conductors LV for the ladder → Local Power

→ 1 clock cable → Local

Rack
Room

→ Bias Voltage
cable for ladder
→ Local power

Clock
Board

1 Duplex Fiber

1 power
cable local

To do list: number and length?

- optical cables,
- power cables (LV, BV)

But what happen to FVTX optical and power
cables that we have right now?

We assume they have been removed
properly and saved.

Cooling Requirements

Requests:

- Cooling of INTT and ROCs **should be independent** of cooling of other **sub-detectors (MAPS)**: cooling temperature can change from one detector to another detector: **lesson learned from FVTX/VTX**.


























- 1) need cooling for the ROCs (south and north sides) ~ 10 degree C.
- 2) cooling of the **Rings** supporting of the ladders the cooling of the ROCs and Rings ladders are different.

- Obviously and as usual:

Need an Engineer for the construction to be associated to the INTT Tracker

- work on cooling requirements
- detectors supports for the ROCs/INTT detector
- cables rooting, cables support, etc...

Wish List

159		1.12.5	INTT Auxiliary Systems and Integration (BNL Responsibility)	1 day?	Tue 1/3/17	Tue 1/3/17		
160		1.12.5.1	INTT Mechanical Service	1 day?	Tue 1/3/17	Tue 1/3/17		
161		1.12.5.1.1	ROC mechanical support	1 day?	Tue 1/3/17	Tue 1/3/17		
162		1.12.5.1.2	INTT Mechanical Support	1 day?	Tue 1/3/17	Tue 1/3/17		
163		1.12.5.2	Cooling System	1 day?	Tue 1/3/17	Tue 1/3/17		
164		1.12.5.2.1	Design	1 day?	Tue 1/3/17	Tue 1/3/17		
165		1.12.5.2.2	Mock up Testing	1 day?	Tue 1/3/17	Tue 1/3/17		
166		1.12.5.2.3	Final Design of Cooling System	1 day?	Tue 1/3/17	Tue 1/3/17		
167		1.12.5.3	ROC Cooling System	1 day?	Tue 1/3/17	Tue 1/3/17		
168		1.12.5.3.1	Design Support/Cooling	1 day?	Tue 1/3/17	Tue 1/3/17		
169		1.12.5.3.2	Fabrication Support/Cooling	1 day?	Tue 1/3/17	Tue 1/3/17		
170		1.12.5.4	Safety System	1 day?	Tue 1/3/17	Tue 1/3/17		
171		1.12.5.4.1	Review Sensors and Interlocks	1 day?	Tue 1/3/17	Tue 1/3/17		
172		1.12.5.4.2	Electrical Interlock Design	1 day?	Tue 1/3/17	Tue 1/3/17		
173		1.12.5.4.3	Cooling Interlocks Design	1 day?	Tue 1/3/17	Tue 1/3/17		
174		1.12.5.5	INTT Electronic Services	1 day?	Tue 1/3/17	Tue 1/3/17		
175		1.12.5.5.1	Extension Cable Trays	1 day?	Tue 1/3/17	Tue 1/3/17		
176		1.12.5.5.2	Fibers + Power Cables + Patch Panel	1 day?	Tue 1/3/17	Tue 1/3/17		
177		1.12.5.5.14	Racks	1 day?	Tue 1/3/17	Tue 1/3/17		
178		1.12.5.5.15	Low Voltage Supplies	1 day?	Tue 1/3/17	Tue 1/3/17		
179		1.12.5.5.16	Bias Voltage Supplies	1 day?	Tue 1/3/17	Tue 1/3/17		
180		1.12.5.5.17	Slow Control Infrastructure	1 day?	Tue 1/3/17	Tue 1/3/17		
181		1.12.5.6	Slow Control System	1 day?	Tue 1/3/17	Tue 1/3/17		
182		1.12.5.6.1	Low Voltage System	1 day?	Tue 1/3/17	Tue 1/3/17		
183		1.12.5.6.2	High Voltage System	1 day?	Tue 1/3/17	Tue 1/3/17		